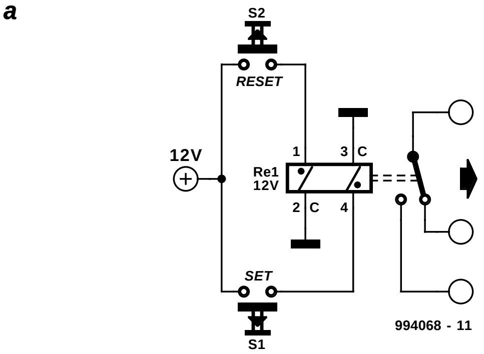
016

bipolar relay with single supply



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When a bipolar relay is to operate from a single supply voltage, normally two coils are needed. When, in Figure 1, the push-button RESET switch briefly connects the second terminal of coil 1 with $+U_\text{b}$, the relay is in one position. Pressing the SET switch briefly causes the relay to switch over to the other position. The relay can, however, change over only if the currents through the coils flow in opposite directions.

There are bipolar relays available that make operation with a single coil possible, but these are quite expensive. These relays are operated with voltages of opposite polarity or with a voltage whose polarity can be reversed.

An alternative, suggested by Robert Friberg in *Model Railroad Electronics*, 4 (‘Adaptor for bipolar switches’, p. 81), is shown in

Figure 2. As in the case of a bipolar relay with two coil, the terminals of the solenoid are alternatively linked to the positive supply voltage, U_b. At the same time as one terminal is connected to $+U_b$, the other is linked to earth by a transistors whose base is connected via a series resistor to the first terminal, that is, $+U_b$.

Low-power bipolar relays with a coil resistance of 2–5 kΩ may be combined with small-signal transistors, such as the BC547. These transistors need a base resistor of about 10 kΩ. Higher power relays need power transistors and base resistors appropriate to the relay coil resistance.

The transistors should be protected against voltage spikes by free-wheeling zener diodes with a zener voltage slightly higher than the operating voltage.

[994068]